

U.S. Patent Application Serial No. 10/790,769
Amendment filed February 25, 2008
Reply to OA dated September 25, 2007

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (*Canceled*)

Claim 2 (*Previously Presented*): An antenna coupling module as set forth claim 10, wherein the perpendicular distance of the electromagnetically coupled space has a length of not more than 1/4 of the effective wavelength.

Claim 3 (*Original*): An antenna coupling module as set forth in claim 2, wherein said effective wavelength includes from a microwave to a milliwave band.

Claim 4 (*Previously Presented*): An antenna coupling module as set forth in claim 10, wherein said planar antenna and said superconductive high frequency circuit have a 1/4 wavelength type feeder line, respectively, as a coupling circuit thereof.

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Claim 5 (Original): An antenna coupling module as set forth in claim 4, wherein a dielectric body is arranged between 1/4 feeder lines for coupling circuit of said planar antenna and said superconductive high frequency circuit.

Claim 6 (Original): An antenna coupling module as set forth in claim 5, wherein at least one type of ingredient selected from the group consisting of magnesium oxide, mullite, forsterite, titanium oxide, lanthanum aluminate, sapphire, alumina, strontium titanate, magnesium titanate, calcium titanate, quartz glass, polytetrafluoroethylene, polyethylene, a polyimide, polymethylmethacrylate, a glass-epoxy composite, and a glass-polytetrafluoroethylene composite is used as the ingredient of the dielectric body.

Claim 7 (Previously Presented): An antenna coupling module as set forth in claim 10, wherein an oxide superconductor is used as the conductor of said superconductive high frequency circuit, and said superconductive high frequency circuit has at least one type of circuit selected from the group comprised of a phase circuit, filter circuit, through line, delay circuit, coupler, distribution circuit, and composite circuit.

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Claim 8 (Previously Presented): An antenna coupling module as set forth in claim 10, wherein said planar antenna has at least one type of antenna element of the dipole type, patch type, and log-periodic type.

Claim 9 (Previously Presented): An antenna coupling module as set forth in claim 10, wherein an oxide superconductor is used as the conductor for said planar antenna.

Claim 10 (Currently Amended): An antenna coupling module comprising a planar antenna, and a substrate forming a planar superconductive high frequency circuit and a metal package, the substrate forming the high frequency circuit being arranged in a perpendicular direction with respect to the element surface of said planar antenna and having said planar antenna and said superconductive high frequency circuit electromagnetically coupled via a space dielectric body within the metal package,

wherein the oxide superconductor for said superconductive high frequency circuit or said planar antenna is at least one type of oxide high-temperature superconductor selected from the group comprised of $\text{Bi}_{n_1}\text{Sr}_{n_2}\text{Ca}_{n_3}\text{Cu}_{n_4}\text{O}_{n_5}$ (where, $1.8 \leq n_1 \leq 2.2$, $1.8 \leq n_2 \leq 2.2$, $0.9 \leq n_3 \leq 1.2$, $1.8 \leq n_4 \leq 2.2$, and $7.8 \leq n_5 \leq 8.4$), $\text{Pb}_{k_1}\text{Bi}_{k_2}\text{Sr}_{k_3}\text{Ca}_{k_4}\text{Cu}_{k_5}\text{O}_{k_6}$ (where, $1.8 \leq k_1 + k_2 \leq 2.2$, $0 \leq k_1 \leq 0.6$, $1.8 \leq k_3 \leq 2.2$, $1.8 \leq k_4 \leq 2.2$, $1.8 \leq k_5 \leq 2.2$, and $9.5 \leq k_6 \leq 10.8$), $\text{Y}_{m_1}\text{Ba}_{m_2}\text{Cu}_{m_3}\text{O}_{m_4}$ (where, $0.5 \leq m_1 \leq 1.2$, $1.8 \leq m_2 \leq 2.2$, $2.5 \leq m_3 \leq 3.5$, and $6.6 \leq m_4 \leq 7.0$), $\text{Nd}_{p_1}\text{Ba}_{p_2}\text{Cu}_{p_3}\text{O}_{p_4}$ (where, $0.5 \leq p_1 \leq 1.2$, $1.8 \leq p_2 \leq 2.2$, $2.5 \leq p_3 \leq 3.5$, and $6.6 \leq p_4 \leq 7.0$), $\text{Nd}_{q_1}\text{Y}_{q_2}\text{Ba}_{q_3}\text{Cu}_{q_4}\text{O}_{q_5}$ (where, $0 \leq q_1 \leq 1.2$, $0 \leq q_2 \leq 1.2$, $0.5 \leq q_1 + q_2 \leq 1.2$, $1.8 \leq q_2 \leq 2.2$, $2.5 \leq q_3 \leq 3.5$, and

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$6.6 \leq q_4 \leq 7.0$), $\text{Sm}_{p_1}\text{Ba}_{p_2}\text{Cu}_{p_3}\text{O}_{p_4}$ (where, $0.5 \leq p_1 \leq 1.2$, $1.8 \leq p_2 \leq 2.2$, $2.5 \leq p_3 \leq 3.5$, and $6.6 \leq p_4 \leq 7.0$),
 $\text{Ho}_{p_1}\text{Ba}_{p_2}\text{Cu}_{p_3}\text{O}_{p_4}$ (where, $0.5 \leq p_1 \leq 1.2$, $1.8 \leq p_2 \leq 2.2$, $2.5 \leq p_3 \leq 3.5$, and $6.6 \leq p_4 \leq 7.0$).

Claim 11 (Previously Presented): An antenna coupling module as set forth in claim 10, wherein said planar antenna is a non-superconductive element.

Claim 12 (Previously Presented): An antenna coupling module as set forth in claim 10, wherein said superconductive high frequency circuit or said planar antenna is cooled to not more than 100K.

Claim 13 (Previously Presented): A telecommunications base station mounting an antenna coupling module comprised of a planar antenna and a substrate forming a planar superconductive high frequency circuit arranged in a perpendicular direction with respect to the element surface of said planar antenna and having said planar antenna and said superconductive high frequency circuit electromagnetically coupled via a space,

wherein the oxide superconductor for said superconductive high frequency circuit or said planar antenna is at least one type of oxide high-temperature superconductor selected from the group comprised of $\text{Bi}_{n_1}\text{Sr}_{n_2}\text{Ca}_{n_3}\text{Cu}_{n_4}\text{O}_{n_5}$ (where, $1.8 \leq n_1 \leq 2.2$, $1.8 \leq n_2 \leq 2.2$, $0.9 \leq n_3 \leq 1.2$, $1.8 \leq n_4 \leq 2.2$, and $7.8 \leq n_5 \leq 8.4$), $\text{Pb}_{k_1}\text{Bi}_{k_2}\text{Sr}_{k_3}\text{Ca}_{k_4}\text{Cu}_{k_5}\text{O}_{k_6}$ (where, $1.8 \leq k_1 + k_2 \leq 2.2$, $0 \leq k_1 \leq 0.6$, $1.8 \leq k_3 \leq 2.2$, $1.8 \leq k_4 \leq 2.2$, $1.8 \leq k_5 \leq 2.2$, and $9.5 \leq k_6 \leq 10.8$), $\text{Y}_{m_1}\text{Ba}_{m_2}\text{Cu}_{m_3}\text{O}_{m_4}$ (where, $0.5 \leq m_1 \leq 1.2$, $1.8 \leq m_2 \leq 2.2$, $2.5 \leq m_3 \leq 3.5$,

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and $6.6 \leq m_4 \leq 7.0$), $Nd_{p_1}Ba_{p_2}Cu_{p_3}O_{p_4}$ (where, $0.5 \leq p_1 \leq 1.2$, $1.8 \leq p_2 \leq 2.2$, $2.5 \leq p_3 \leq 3.5$, and $6.6 \leq p_4 \leq 7.0$),

$Nd_{q_1}Y_{q_2}Ba_{q_3}Cu_{q_4}O_{q_5}$ (where, $0 \leq q_1 \leq 1.2$, $0 \leq q_2 \leq 1.2$, $0.5 \leq q_1 + q_2 \leq 1.2$, $1.8 \leq q_2 \leq 2.2$, $2.5 \leq q_3 \leq 3.5$, and

$6.6 \leq q_4 \leq 7.0$), $Sm_{p_1}Ba_{p_2}Cu_{p_3}O_{p_4}$ (where, $0.5 \leq p_1 \leq 1.2$, $1.8 \leq p_2 \leq 2.2$, $2.5 \leq p_3 \leq 3.5$, and $6.6 \leq p_4 \leq 7.0$),

$Ho_{p_1}Ba_{p_2}Cu_{p_3}O_{p_4}$ (where, $0.5 \leq p_1 \leq 1.2$, $1.8 \leq p_2 \leq 2.2$, $2.5 \leq p_3 \leq 3.5$, and $6.6 \leq p_4 \leq 7.0$).